

## CLAIMS

1. A rack-and-pinion steering apparatus including pinion teeth provided on a circumferential surface of a pinion shaft and rack teeth provided on an outer surface of a rack shaft, meshed with each other without backlash, so as to transmit rotation of the pinion shaft connected to a steering member to the rack shaft via a mesh portion between the pinion teeth and the rack teeth, thus to move the rack shaft in an axial direction thereof at a predetermined stroke ratio for execution of steering operation,

characterized in that the pinion teeth and the rack teeth are provided with a pressure angle  $\alpha$  set within a range of  $24^\circ$  to  $30^\circ$ , and a module  $m$ , a number of teeth  $z$ , a tooth depth  $h$  and a helix angle  $\beta$  selected based on the pressure angle  $\alpha$  and the stroke ratio so as to satisfy a predetermined design condition, from the following respective ranges:

module  $m$ : 1.8 to 2.0

number of teeth  $z$ : 7 to 13

tooth depth  $h$ :  $2m$  to  $2.5m$

helix angle  $\beta$ :  $40^\circ$  or smaller

2. The rack-and-pinion steering apparatus according to claim 1, wherein the pinion teeth comprises a modified tooth surface subjected to a tooth surface modification such that a pressure angle error oriented so as to increase a mesh stress with the rack teeth is

provided in a direction of the tooth profile, and that a central portion thereof is formed in a convex shape.

3. The rack-and-pinion steering apparatus according to claim 1 or 2, wherein the pinion teeth comprises a modified tooth surface subjected to a tooth surface modification of crowning along a tooth trace direction.

4. The rack-and-pinion steering apparatus according to any one of claims 1 to 3, comprising a motor for steering assistance disposed between the steering member and the pinion shaft, thus to constitute an electric power steering apparatus that transmits the rotational force of the motor to the pinion shaft to assist the steering operation executed according to the rotation of the pinion shaft.